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The Information Content of Municipal Bond Rating Changes: A Note

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MUNICIPAL BOND RATING CHANGES have positive social value if they signal previously unavailable information on changes in municipal financial soundness. Weinstein [11] has found that rating changes for corporate bonds do not appear to contain relevant new information. His finding is consistent with that of Pinches and Singleton [7], that stock price adjustments occurred several months prior to a corporate bond rating change. Rating agencies apparently respond to changes in corporate financial and operating conditions several months after the information is impounded in bond and stock prices.¹ However, as a result of institutional differences between corporate and municipal bond markets, it is possible that rating changes for municipal bonds do convey new information.

This note examines the information content of municipal bond rating changes by evaluating municipal bond price adjustments during the period surrounding a rating change. The joint hypothesis tested is that municipal bond rating changes convey information to investors which is relevant for assessing equilibrium values of the securities, and that the municipal bond market is efficient so that valuation changes occur simultaneously with rating changes.

The following section examines the institutional setting of the municipal bond market in order to specify why information content of bond rating changes might be anticipated. Remaining sections of the paper describe sample selection, derivation of test data, findings, and discussion.

I. Institutional Setting

Financial accounting information about municipalities is generally less reliable, less comparable cross-sectionally, and less timely than information about corporations [1]. Information about municipal revenues, assets, and liabilities is provided annually by most cities. However, this information often is not prepared in accordance with generally accepted accounting principles and may not be audited by an independent certified public accountant. Each city can design its

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¹ The findings of these studies appear at odds with those of earlier studies [2, 3, 4] in which less market anticipation of rating changes was found. Weinstein [11] critiques the earlier studies on adequate examination of statistical properties and on possible sample selection bias while Pinches and Singleton [7] assert that market segmentation and frictions may be impairing a rapid reflection of all available information in the bond market. Weinstein's findings provide evidence to refute both the earlier studies and the Pinches and Singleton assertion.

own unique reporting format, except in a few states which regulate the municipal reporting format to promote greater intrastate comparability. Municipal financial statements generally lag fiscal year closings by six to nine months, whereas the corresponding lag for corporate statements is of the order of three months. Subscription services provide less timely information about municipalities than about corporations. Financial and demographic information on selected municipalities are updated on an eighteen-month (or longer) cycle² while U.S. Bureau of Census data on municipal finances and demographics have approximately a two-year lag.

The market for municipal debt is broad with nearly \$42 billion of long-term debt issued through 5,011 separate offerings in 1979 [6].³ Underwriters market approximately twenty percent of municipal offerings and are required under a 1975 amendment to the Securities Exchange Act of 1934 to provide certain information to the public about the offerings. The required information is similar to that demanded by municipal bond rating agencies, which generally re-evaluate rating classifications in conjunction with a new offering. Thus, most bond rating changes occur in conjunction with a proposed debt offering.

Rating agencies such as Moody's and Standard and Poor's require rated municipalities to file annual reports in addition to special reports prior to new debt issues or as "the situation warrants" [10, p. 102]. However, not all municipalities are rated. A rating is initiated upon request of a municipality and requires a signing of contracts and payment of fees.⁴ A rating agency usually completes its analysis within five weeks of the receipt of information [10]. Rating announcements (confirmed, revised, or withdrawn) are released in *Moody's Bond Survey* every Monday morning for issues coming to the market during the week. Thus, rating announcements are released before the publication of the final prospectus. The same rating is assigned to all general obligation bonds of a given municipality. Therefore, changes in ratings for general obligation bonds of a given municipality apply to any proposed issue in addition to all outstanding general obligation issues.

All information supplied to rating agencies is not necessarily contained in a new prospectus, nor has all the information necessarily been widely disseminated. One would, however, presume that all relevant value affecting information is in the prospectus. The rating change may still reflect some "nonpublic" information and a rating change may be an important signal to market participants. Even if the rating change reflects only public information, price adjustments may still be prompted by a rating change if the costs to market participants of securing and evaluating the information contained in alternative sources (such as a new issue prospectus) exceeds the expected gains from processing the information.

² For example, see reports of the South Carolina Municipal Council [8].

³ In recent years, many municipalities have experienced fiscal distress, as is evident in the number of municipal downgradings. While distressed cities may apply political pressure in an attempt to have bond ratings upgraded, banks and other financial institutions have a vested interest in the lower ratings in that they can earn higher yields or limit risk by being legally restricted from acquiring investments below "investment quality," as determined by bond ratings. The political dynamics associated with bond rating changes are complex, and few generalizations are possible.

⁴ Moody's charges .0001 times the face value of the issue while Standard and Poor's fee ranges between \$500 and \$2,500 and is generally about \$750.

II. Sample Selection and Data

The availability of data on transactions in the secondary market for municipal bonds limits empirical research. While bid and ask quotes on a limited list of more commonly traded municipal revenue bonds appear in the *Wall Street Journal*, the size of this sample was too small for this study. Therefore, a sample of noncallable, general obligation bonds issued by 127 municipalities was selected for study on the basis of the frequency of the bond's listing in the *Blue List* [9] during the period from August 1976 to February 1979.⁵ Ending monthly quotes in each of the first four months were required for the preliminary sample. The final sample was obtained by deleting any municipality which had more than two consecutive missing observations. A missing observation occurred if no bonds issued by a particular municipality were listed in a given month. Data on a given municipal bond provided in the *Blue List* consist of its maturity, coupon rate, offering agent, offering price or yield to maturity, and quantity offered.

Offering yields to maturity on the last trading day of each month from August 1976 to February 1979 were employed in the empirical tests.⁶ Sampling criteria resulted in a bias towards larger cities and Northeastern cities whose bonds are

Table I
Moody's Bond Ratings and Changes for 127
Municipalities

From	To						Totals
	BA	BAA	A	A1	AA	AAA	
BAA	—	7	2	—	—	—	9
A	2	3	10	8	—	—	23
A1	—	—	6	23	2	—	31
AA	—	1	2	5	37	1	46
AAA	—	—	—	—	1	17	18
Totals	2	12	19	36	40	18	127

⁵ The *Blue List* is published every weekday, except holidays, by the Blue List Publishing Company, a division of Standard and Poor's Corporation. The bonds listed in a specific issue are offered, subject to prior sale and change in price, at the close of business on the day before the date of the *Blue List* release. Offering agents are typically security dealers and commercial banks.

⁶ Since offering yields do not necessarily reflect actual trading yields, a test of conformity between the two was performed. Monthly holding period returns during calendar 1978 were calculated on both the bid and the average of bid and asked price for thirty-eight municipal revenue bonds regularly quoted in the *Wall Street Journal*. Monthly holding period returns for the same bonds were also calculated from the offering yields reported in the *Blue List*. Tests of significant differences between the means of holding period returns based on the *Wall Street Journal* bid series and the *Blue List* offering series produced a Student t-value of 0.12, which is only significant at the 0.48 level. Differences between the means of holding period returns based on the *Wall Street Journal* average bid/asked series and the *Blue List* offering series produced a Student t of 0.06, which is only significant at the 0.75 level. Additionally, the sign of the month-to-month changes in holding period returns from *Blue List* yields and *Wall Street Journal* quotes were compared (by bond) and were in agreement 96% of the time, indicating strong correspondence between the *Blue List* and the *Wall Street Journal* series. Conclusions on congruence between offering yields and actual trading yields to maturity still cannot be drawn, even though support is found for the contention that offering yields effectively surrogate bid and asked quotes as proxies for trades.

traded more frequently than those of other municipalities. A listing of the municipalities included in the sample is provided in an Appendix available upon request from the authors.

Of the 127 municipalities in the sample, 33 experienced bond rating changes (Moody's [5]) between May 1977 to April 1978; of these changes, 20 were downgradings and 13 were upgradings. Table I shows the distribution of bond ratings and the type and frequency of rating changes in the sample. Numbers above the diagonal represent upgradings; numbers along the diagonal represent unchanged ratings; numbers below the diagonal indicate downgradings.

III. Determination of Bond Yields

The same issues of general obligation bonds for a given municipality are not listed consistently in each issue of the *Blue List*, as would be ideal for tests of the market response to a new event. Since municipal general obligation bond ratings are not issue specific, tests can employ yields from different issues of the same municipality as long as maturity and coupon effects can be controlled. Yields can be decomposed into three components: a market component; a bond-specific component due to differences in maturity dates and coupon rates, and a municipality-specific component reflecting the individual economic characteristics of the city. The second component must be controlled in order to eliminate issue-specific differences. Period to period variations in the coupon and maturity composition of a municipality's set of bonds introduces additional noise that, unless controlled for, decreases the likelihood of finding significant effects of a rating change. A yield for each municipality for each month of the study was derived by controlling for differences in maturity dates and coupon rates.

A yield premium for each municipality for each month of the study was derived by subtracting from the yield to maturity of each municipal issue the estimated yield to maturity of a U.S. Treasury Bond with the same maturity and coupon:

$$YP_{it} = Y_{it} - \hat{Y}_{ut}(M_{it}, C_{it}) \quad (1)$$

where YP_{it} is the yield premium on security i in period t , Y_{it} is the yield to maturity on the same security, and $\hat{Y}_{ut}(M_{it}, C_{it})$ is the estimated yield to maturity on a Treasury Bond with equivalent maturity (M) and coupon (C). An additional control over yield curve differences resulted from selecting the shortest maturity issue listed for municipalities with multiple issues reported.

The yields on Treasury Bonds with given coupon and maturity were estimated from the yield regressions:

$$Y_{ut} = \gamma_{0t} + \gamma_{1t}C_{ut} + \gamma_{2t}M_{ut} + e_{ut} \quad (2)$$

where Y_{ut} is the yield to maturity for Treasury Bond u in period t ($t = 1 \dots 31$, corresponding to August 1976, September 1976, etc.), C is the coupon rate, M is the logarithm of maturity (in months),⁷ and e is the residual. The regressions were estimated for each period using all nonserial Treasury Bond issues listed in Moody's [5]. The average R^2 for these regressions was .89 and ranged from .78

⁷ A logarithmic transformation proved to be useful for controlling the nonlinear effect of maturity.

to .95. The resulting yield premium is assumed to reflect the risk of the municipality as assessed by the market.

IV. Assessment of Information Content

The effect of bond rating changes was assessed by comparing the average yield premium for municipalities which experienced a rating change with the average yield premium for equivalently rated municipalities which experienced no rating change. An unweighted average yield premium YP_{jt}^u was calculated for each bond rating class j ($j = 1 \dots 6$) for each month t . The YP_{jt}^u were simple averages of the yield premiums as defined previously of the nonchange municipalities in each rating class. Differential yield premiums were calculated for each of the 33 rating change municipalities, for each of the seventeen months around the rating change, as follows:

$$YP_{it}^d = YP_{it}^c - YP_{jt}^u \quad (3)$$

for $t = -8, -7, \dots, 0, \dots, 8$ where YP_{it}^c is the yield premium calculated from Equation (1) for each of the thirty-three municipalities with rating changes, and t is time relative to the rating change month. The YP_{jt}^u for each computation corresponded to the pre-change rating class for each rating change municipality. The pre-change class premium was used throughout the 17 month period. The YP_{it}^d series (33 return differentials, 17 months) was used to form two portfolios: the first consisted of the differentials for 13 upgraded municipalities, while the second portfolio consisted of the differentials for the 20 downgraded municipalities.

Rating changes were intentionally limited to the period May 1977 through April 1978 to enable the derivation of YP^d for a minimum of 8 months prior and 8 months after the rating change.⁸ At least one bond yield, Y_{it} , was available for each municipality experiencing a rating change for every month in which a yield premium was calculated. Thus, there were no missing observations of YP^d . For each month the mean differential for each portfolio (upgraded and downgraded) was determined, $\overline{YP}_t^d$, for $t = -8, -7, \dots, +8$ surrounding the rating change month (at $t = 0$). Differences initiated by the rating change, and any contemporaneous event, would be reflected in the yield premium differential for $t = 0$.

V. Results

Table II presents the yield premium differentials and test statistics for the two portfolios. The impact of the bond rating change clearly occurred during the month of the change. Prior to the change, the yield premium differential did not

⁸ Municipalities with rating changes outside of this range were eliminated during the initial sample formation. Rating changes were distributed uniformly over the May 1977 through April 1978 period. The distribution of changes from the first month to the last are: 1, 2, 2, 4, 5, 4, 1, 4, 3, 1, 3, and 3. Thus, abnormal returns for the $t = 0$ month for the set of bonds with rating changes occurred over the entire twelve months and were not associated with a specific "critical" month in which a single exogenous event influenced all rating changes and, thereby, the occurrence of the observed significant abnormal returns.

Table II
Mean Yield Premium Differentials for Downgraded and Upgraded Portfolios

Month Relative to Change	Down (N = 20)		Up (N = 13)	
	Mean Differential Percent ($\times 10$) ⁻²	<i>t</i> -Statistic	Mean Differential Percent ($\times 10$) ⁻²	<i>t</i> -Statistic
-8	.87	.81	.73	.52
-7	-.96	-.75	-1.21	-1.19
-6	1.52	1.15	-.98	-.72
-5	1.07	1.23	.64	.54
-4	-.84	-.62	1.73	1.20
-3	.54	.45	-1.40	-.64
-2	-1.84	-1.32	.99	.55
-1	1.37	1.01	-.84	-.52
0	11.26	5.72*	-9.79	-4.01*
1	9.11	5.15*	-11.00	-5.21*
2	9.99	5.20*	-10.35	-4.56*
3	10.95	6.29*	-9.20	-3.57*
4	9.91	5.27*	10.10	-4.55*
5	9.38	5.24*	-11.42	-5.49*
6	10.34	5.20*	-10.58	-4.72*
7	9.12	4.47*	-9.88	-4.10*
8	10.02	4.99*	-10.94	-4.29*

* Significant at $\alpha = .01$.

appear to anticipate the impending rating change. A significant differential yield premium was observed in the change month, $t = 0$. Thereafter, the magnitude of the differentials were of the same order. Consistent with the information content hypothesis, the upgraded portfolio experienced a yield differential of $-.098$ percent while the yield differential of the downgraded portfolio was $.113$ percent for the month of rating change. The significant differential at $t = 0$ and the consistency of subsequent significant differentials is consistent with market efficiency.

VI. Discussion

The use of offering yields to maturity to estimate trade yields is not ideal. However, data limitations do not appear to allow superior alternatives. While obviously tentative, the results offer strong circumstantial evidence of the uniqueness of the municipal market environment.

The findings differ from those of Weinstein [11] and Pinches and Singleton [7] who found evidence that corporate bond rating changes provide little information in an efficient market of common stocks and corporate bonds. Rating changes may provide information in the municipal market where significant lags separate events and financial information disclosures, where the cost of gathering and analyzing information is substantial, and where rating changes occur contemporaneously with (and reflect) the release of new information to the public.

Under these circumstances, rating changes may contain information or provide an efficient (low cost) means for processing new information. Our findings are consistent with the suggested scenario: significant yield premiums of the appropriate sign are found in the month of rating change for both upgraded and downgraded municipal bonds.

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